NEXOF-RA
NESSI Open Framework – Reference Architecture

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Collaboration Plan v2

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2.0	20/01/2009	First Partner's feedback	Stuart Campbell Stefano de Panfilis Vanessa Stricker	Some comments have been included to the document
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2.2	27/02/2009	Second Partner's feedback	Mercedes Avilés	Minor changes have been considered
3.0	24/03/2009	Final version	Stefano De Panfilis	Final review

EXECUTIVE SUMMARY

In order to increase the awareness and impact of the European Research ICT projects funded by the 7[Th] Framework Programme there is an ongoing effort of establishing collaboration activities under the service and software architectures, infrastructures and engineering area.

This document consists of the collaboration plan for NEXOF-RA project. It outlines main target audiences as well as projects considered of interest by NEXOF-RA to collaborate with in order to strength links and achieve common shared and tangible results. In addition, this plan also contains the modalities of such collaboration covering exploitation of technical synergies as well as joint actions for the dissemination of results. This plan outlines not only main collaboration actions done during the First year of the NEXOF-RA project but also other planned actions to be considered in the short term.

This plan is a life folder document that will be updated through subsequent versions of the deliverable taking into account the outcomes of all the actions carried out by NEXOF-RA and concerned projects under the collaboration framework here proposed.

Document Information

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Abstract (for dissemination)	The document describes the plan for collaborating between NEXOF-RA, the NESSI Strategic Projects as well as other related projects			
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1 INTRODUCTION

The scope of this deliverable is to define the plan for collaboration between the NEXOF-RA project and other projects. The plan is defined in terms of the projects involved, main modalities of collaboration and main current collaboration actions. The NEXOF-RA project aims to achieve the highest possible impact and as such needs to take maximum benefit from collaboration opportunities. A final benefit of collaboration is the avoidance of redundancy between similar overlapping solutions created by the various projects within related research fields. Various collaboration opportunities have been identified and acted upon.

This collaboration plan has been created with the support of consortium partners and collaborating projects. As public document it will be shared with people from other projects NEXOF-RA has decided to collaborate with.

Besides the executive summary and the introduction to the document, the main sections consist of:

- Chapter 2, which consists of the collaboration plan that includes the target audience and main projects considered by NEXOF-RA to collaborate with.

- Chapter 3, which contains the two potential modalities of collaboration that include technical and dissemination activities.

- Chapter 4, which describes the existing collaboration plan between NEXOF-RA and NESSI Strategic Projects.

- Chapter 5 highlights current collaboration activities with other non NESSI and related NEXOF-RA projects. It also remarks some other specific and punctual collaboration.

- Chapter 6 refers to the conclusion.

In addition, some references that give valuable added value to the document are considered.

2 COLLABORATION PLAN

This section contains the addressed target audience and a brief description of the identified projects to collaborate with.

2.1 Target Audience

NESSI Strategic Projects as well as EU funded projects are considered the major audience for achieving a NEXOF collaboration plan. Projects related by a common interest to NEXOF-RA have been identified as main projects to strength links aimed at exploiting technical synergies and join efforts for the common results dissemination. In this sense, several NEXOF-RA related projects have already been contacted and thus collaboration has long been initiated. Still, new projects and initiatives will be subject of collaboration in the future. In the meantime, a short description of the main projects involved in the collaboration is provided in the next sections 2.2 and 2.3.

2.2 NESSI Strategic Projects

2.2.1 EZWEB

EzWeb will provide an open source reference implementation of standard technologies for the front-end web access layer in next-generation SOA and the future Internet of Services. The project proposes a new approach for making services available to end users. The concept of a "web resource" is introduced and essentially becomes the basic building block that puts a "face" on contents and services and makes them "visible and tangible" to end-users. The users can search for these building blocks in a catalogue and combine them into a personal "workspace". These web resources can then be linked together by the user himself in order to create flows of information that are triggered by interacting with web resources. This way, end users can easily create their own front-end that are completely adapted to their real needs and personal processes.

Benefits of this approach are listed below:

- Users become part of the development lifecycle: they build and personalize their own applications by self-servicing from a universe of available resources
- Users can collaborate and share resources (contents and applications) as well as knowledge about them by means of the catalogue
- Interaction can adapted and made relevant to the context, using "context" with its widest meaning possible (device, situation, social context, …)
- The platform is also proactive and assists users through smart agents that exploit knowledge about context and learn from users' interaction
- Captured knowledge is analyzed in order to propose automation of routine processes
- Provide the foundation for an open marketplace and sustainable business ecosystem where back-end providers publish resources and brokers/ aggregators make these resources available to end-users.

EzWeb is dealing with the development of the following front-end components:

- Web Platform: web-resources front-end mash up, wiring, tagging, navigation, correlation, discovery, Context-based adaptability
- Resource market-place components: resource registration, link to back-end services, usage accounting.

2.2.2 MASTER

The objective of MASTER is to develop a compliance checking engine for SOA-based enterprises. In particular, MASTER is focusing on security compliance of related regulations and standards, like SOX, HIPPA, Data protection laws, ISO2700X, and the like. MASTER will produce security metrics to assess the level of compliance of a particular regulation, while helping the CIO/CTO ensure compliance to multiple regulations/standards at once, since MASTER helps match different requirements to a single control, thereby simplifying the task of compliance.

2.2.3 RESERVOIR

The aim of the 3 year RESERVOIR project that has started in 2008 is to provide architectures, open standard and new technologies to create a scalable, flexible and dependable framework for delivering services as utilities while federating diverse infrastructures. The RESERVOIR approach is based on a clear separation between services providers and infrastructure providers (IPs) – enabling service providers to use federations of IPs and access resources beyond the capacity limitations of an individual IP.Therefore RESERVOIR will drive the development of next generation data centers and federated cloud infrastructures. RESERVOIR aims to demonstrate quantified and significant improvements in service delivery productivity, quality, availability and cost. Other key technologies being developed in RESERVOIR include:

- The development of the technologies to enable the migration of both virtual machines and Virtual Java Service Containers across network and storage boundaries
- Algorithms for the allocation of resources to conform to SLA (Service Level Agreement) requirements
- The creation of a formal Service Definition Language to support service deployment and life cycle management across RESERVOIR sites
- Security mechanisms for the safe deployment and relocation of virtual machines across physical machines, and RESERVOIR sites
- The development of a business information model as well as business oriented payment and billing mechanisms to charge for resources used across one or more RESERVOIR sites
- Test-bed development to benchmark performance of actual industrial use cases in a RESERVOIR environment.

RESERVOIR services are accessed via three sets of interfaces:

- The Service Management Interface (SMI) – to manage service delivery, deployment and the lifecycle of a service

- The Virtualization Management Interface (VMI) – to manage the allocation of virtual resources, control and monitor them

- The Virtual Host Interface (VHI) – to shield high level management components from the specific virtualization technologies used by a site.

The corresponding core functional components of the RESERVOIR cloud middleware are:

- A Service Manager

- A Virtual Environment Manager (VEEM)

- A Virtual Environment Host (VEEH).

2.2.4 SLA@SOI

Launched on June 2nd 2008, this project is committed to research, engineer and demonstrate technologies that can embed SLA-aware infrastructures into the service economy. It consists of 13 European partners.

The main objective of SLA@SOI is the development of a comprehensive, industrial strength SLA management framework that incorporates multi-modal monitoring capabilities (e.g. post-mortem and predictive monitoring), cuts across different layers of a service-based system and the infrastructure(s) where it is deployed having an explicit focus on the business aspects of SLAs, and integrates these capabilities with comprehensive service-based system resourcing and adaptation mechanisms. The SLA@SOI scope is the definition, negotiation, and monitoring of SLAs between various layers of a service infrastructure.

2.2.5 SOA4All

The outcome of SOA4All will be a comprehensive framework and infrastructure that integrates four complimentary and revolutionary technical advances into a coherent and domain independent service delivery platform:

- Web principles and technology as the underlying infrastructure for the integration of services at a world wide scale

- Web 2.0 as a means to structure human-machine cooperation in an efficient and cost effective manner

- Semantic Web technology as a means to abstract from syntax to semantics as required for meaningful service discovery

- Context management as a way to process in a machine understandable way use needs that facilitates the customization of existing services for the needs of users.

The strategic impact of SOA4All is broad ranging. SOA4All will have impact in terms of new frameworks, new platforms and new infrastructures transforming the Web into a Web of billions of services.

Moreover, SOA4All will reach not only academic and industrial communities related to software and services but also the European citizens. SOA4All has the chance to influence the NEXOF-RA results, fostering the SOA4All results as key contributions to the reference model and architectural specification of Service Centric System domain.

2.3 Other Related Projects

2.3.1 COMPAS

The Compliance-driven Models, Languages, and Architectures for Services project addresses a major shortcoming in today's approach to design of SOAs: throughout the architecture various compliance concerns must be considered, but so far, the SOA approach does not provide any clear technological strategy or concept of how to realize, enforce, or validate them. A number of approaches, such as business rules or composition concepts for services have been proposed, but none of these approaches offers a unified approach with which all kinds of compliance rules can be tackled (including user side and regulations). This is in part due to the problem that compliance rules are often pervasive throughout the SOA. That is, they have to be considered in all components of the SOA, as well as at different development times, including analysis time, design time, and runtime.

To address the problem sketched above, the COMPAS project will provide a core software framework that is built using the model-driven software development (MDSD) paradigm to enable companies to rapidly develop and then stably evolve and maintain a customized business compliance software framework.

The COMPAS business compliance software framework for SOAs will be used to compose business processes and services, and express and validate all compliance concerns related to these processes and services.

COMPAS has been awarded by NESSI ETP as a NESSI Compliant project since meeting the following criteria:

Role criteria first, since COMPAS project:

- Will significantly advance state of the art in the focused area of compliance to the broad sense which is of utmost importance/relevance in the context of an Open Service Framework setup

- Has been designed with higher research innovation content than a NESSI Strategic Project.

Output criteria second, since COMPAS Project has been designed to:

- Significantly contribute to the set-up of an Open Service Framework while being compliant to open source and open standards principles which are core to NESSI

- Nicely complement the work undertaken by NESSI Strategic Projects. Meaning here that COMPAS Projects results would be made available to these projects for selection and/or adaptation.

Consortia criteria

- Since is supported by Thales (a NESSI ETP partner) and partners which are also members of various NESSI Working Groups (e.g. Service Engineering, Business Process Modelling, Trust, Security and Dependability).

Pascal Bisson and Daniel Gidoin from Thales respectively member of NESSI Strategic Research Agenda Committee and NESSI TSD WG co-chair are also in charge to maintain close link between COMPAS and NEXOF(-RA) despite other concertation meetings in which those two projects could be involved in.

2.3.2 NESSI 2010

NESSI 2010 is a 24 months support action, from April'08 to March '2010.Its goal is to support NESSI in specific areas, by focusing on:

- NESSI Strategy formulation and implementation
- NESSI Community clustering and animating through Working Groups
- Interlinking activities, mainly towards coordination towards national programs
- SME activities, mainly towards ICT1 SMEs[2] involvement
- Selected NESSI awareness activities, mainly through events and dissemination activities.

NESSI 2010's implementation is shared between a subset of NESSI partners that have committed to allocate the human and financial resources to the benefit of the entire NESSI community. These partners are:

- Atos Origin – manager of the interlinking activities
- Engineering – manager of the NESSI Strategy & Communication activities
- Thales – manager of the NESSI Office, supporting strategy formulation and
- Board and Steering Committee support
- TIE – manager of the ICT SME specific activities.

Through its specific activities, the strategic impact of NESSI 2010 is oriented towards:

- The NESSI Community: keeping it aware, involved and participative to the overall NESSI implementation
- The ICT community at large and the potential users of IT[3]services; making them aware of the impact of services, the potential of NEXOF and its progress.

NEXOF-RA has a key role within NESSI's strategy; it operates the open call process to NEXOF, it is in charge of providing the NEXOF Reference Architecture, it serves as

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[1] Information and Communication Technology

[2] Small and Medium Enterprise

[3] Information Technology

the focal point for the advancement, progress and contributions of NEXOF. NESSI 2010 has also a key role within NESSI's strategy: it updates the overall communication and dissemination strategy and it coordinates its implementation.

Collaboration between NESSI 2010 and NEXOF-RA is key in ensuring that NEXOF's visibility and open calls are disseminated to the entire ICT community[4], that NEXOF's results and contributions are highlighted in a consistent approach, that the coherence of NESSI, NEXOF, NSPs,[5] and Working Groups activities is continuously monitored and disseminated. In this sense, while collaboration between all the NSPs ensures the consistency of NEXOF, the collaboration between NEXOF-RA and NESSI 2010 (and between NESSI 2010 and all the NSPs) is key in making this consistency visible to the entire ICT community.

2.3.3 S-Cube

The major research related goal of S-Cube is to incubate the next wave of service technologies and methodologies by developing holistic service engineering and adaptation principles, techniques and methods. The major integration related goals of S-Cube are to establish a unified, multidisciplinary, vibrant research community and inaugurate a Europe-wide education and training program for researchers and industry. Moreover, S-Cube will establish a trust relationship with industry and work towards a European distributed services laboratory.

Key to organizing the research activities in S-Cube is the S-Cube research framework. Basically, the framework distinguishes between principles and methods for engineering service-based applications and the technologies which are used to realize those applications. Principles and methods address cross-cutting issues like adaptation and monitoring, as well as quality definition, negotiation, and assurance. Technologies support specific requirements of individual layers of a service-based application and provide capabilities for cross-cutting principles and methods.

From an architectural perspective, thus both S-Cube and NEXOF-RA are addressing all layers of a service-based system, including infrastructure, service composition, business process management, as well as user interaction.

In order to make knowledge of the different research disciplines involved in S-Cube explicit and to support common understanding, S-Cube strives to define a comprehensive and integrated knowledge model. This knowledge model will constitute definitions of terms and their dependencies, as well as links to different research disciplines and competencies of different research communities and institutions. Similarly, in NEXOF-RA a conceptual model is developed, that describes the concepts and relationships of service-based systems. Each of these concepts is defined in the NEXOF-RA glossary.

From a terminology point of view, thus both S-Cube and NEXOF-RA aim at achieving an agreed understanding of service terminology.

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[4] NESSI members and non NESSI members

[5] NESSI Strategic Projects

3 MODALITY OF COLLABORATION

The concrete collaboration modalities are summarized hereafter. They are basically two and they can be identified as follows:

- The Exploitation of Synergies and technical concertation by means of participating to the Open Construction Process and workshop/collaborative working groups.

- Joint dissemination actions aimed at different target audiences: Industry, scientific community and users in general. Most activities are mainly presentations in conferences and workshops. In addition, special sessions co-located in events, about related issues, allow a more focused dissemination.

3.1 Open Construction Process (OCP)

In order to achieve "The Open Reference Architecture" NEXOF-RA has launched the Open Construction Process based on collaborative relationships, where both NEXOF-RA and the contributing parties such as Industry and academia sector, go beyond their common vision to adopt common references, such as shared principles, definitions, models, architectures, standards, and processes to achieve the Open Reference Architecture. All NESSI Strategic projects will contribute to NEXOF-RA by participating in the Open Construction Process (OCP).The OCP is implemented by the NEXOF-RA Community, which is composed by different key actors depending on its impact. This Open Construction Process has started with launching the 1st Invitation to Contribute (ITC) in July '08 and the 2nd ITC in February'09 in order to achieve the Reference Architecture of NEXOF-RA. Both calls have focused on different areas and topics to contribute as they are listed in figures 1 and 2 (pages 14-15).In addition, this participation to the Open Construction Process is based on main three kinds of collaboration:

- Contribution to several Invitations to Contribute (ITC) calls launched by NEXOF –RA during the life of the project. To date, the 1st and the 2nd Invitations to Contribute and have been already launched in July'08 and February'09 respectively

- NEXOF-RA Architecture Board that includes all NESSI SP. It decides about the start of a new Open Construction Cycle. It meets about monthly through phone conference, and every trimester in a face-to-face manner

- Day to day contribution to the Advanced User Service Interaction by Ezweb, Service Centric System Architecture by the SLA@SOI and SOA4All project, Adaptive Service-Aware Infrastructure by RESERVOIR and SLA@SOI and to the Non-Functional Aspects Cross-Cutting the whole ICT infrastructure by MASTER.

Collaboration Area	Topic	Topic	Topic	Topic
Core Service Framework	Service Description Techniques	Design time service composition	Service Discovery	Interoperability of Message-Based Service Interaction
User Interaction	Declarative UI Authoring Languages	Context Model and Universal APIs		
Infrastructure	Definition of Infrastructure Services			
Security	Dynamic identity management for SOA	Privacy Management in SOA		
Quality of Service	Scalable Approaches to Service Oriented Infrastructures	Highly Availability for Multi-Tier Architectures		

Table 1: Main areas and topics to contribute in the 1st ITC

Collaboration Area	Topic	Topic
Core Service Framework	Runtime Service Composition	
User Interaction	Metadata for Service Front End Resources (Phase I)	APIs for Service Front End Resources (Phase I)
Infrastructure	Infrastructure usage and management interfaces	
Security	Multi-level Security for SOA	Dynamic Security for SOA
Quality of Service	Service Level Agreement (SLAs) and Quality of Services and QoS	Federated and Autonomic Management in SOA

Table 2: Main areas and topics to contribute in the 2nd ITC

All NESSI Strategic projects (SOA4All, RESERVOIR, SLA@SOI, Morfeo EZWEB and MASTER) have been invited by the NEXOF-RA Management Board as core partners in the creation of the Open Reference Architecture. They are also involved in most phases of the Open Architecture Specification Process and play a key role as contributors to the Open Construction Process .Besides the NESSI SP contribution to the Open Process, other NEXOF-RA related projects and initiatives have been also invited to participate to the Open Process in terms of the several Invitation to Contribute. In this sense, both, chapters 4 and 5 summarize the existing collaboration activities between NEXOF-RA and not only NESSI Strategic Projects but also other related projects to NEXOF-RA.

3.2 Collaborative Working Groups, clustering meetings

They are intended to bring together mayor players in the related NEXOF-RA domains to exchange knowledge as well as to search and share common approaches and technologies. They also focus on providing an opportunity for projects to exchange information on the scope of work in progress, identifying key issues of common interest and potential collaboration and agreeing future clustering activities.

3.3 Joint Dissemination

Dissemination actions are aimed at different target audiences: Industry, scientific community and users in general. Most activities are mainly presentations in conferences and workshops. In addition, special sessions co-located in events, about related issues, allow a more focused dissemination.

4 EXISTING COLLABORATION ACTIONS WITH NESSI SP

4.1 SOA4All

Collaboration between SOA4All and NEXOF-RA focuses on the exploitation of technical synergies through the SOA4All contribution to the Open Construction Process (OCP) of NEXOF-RA, in terms of the Invitations to Contributes as well as the Architecture Board Meetings. In addition, SOA4All also contributes at the technical level by providing terms for the NEXOF-RA glossary. Main technical collaboration activities done between NEXOF-RA and SOA4All are listed below:

- SOA4All has participated to the 1st Invitation to Contribute, in particular to the Core Service Framework Area concerning the Service Description Techniques and the Design Time Service Composition topics. On one hand, SOA4All has submitted a position paper about *"Service Description Technology Lightweight Service Semantics and Annotations Common for WSDL and Restful Web Services"*. This contribution was intended to bring the concepts of WSMO-Lite[6] and MicroWSMO[7] to the NEXOF-RA Service Description Activity.SOA4All focuses on incremental and modular introduction of semantics into service descriptions, and thus complements the more expressive and well-known frameworks such as WSMO[8]. While, lightweight, the SOA4All Semantic Web service description approach has sufficient expressivity to cover most of the known deployments of the larger frameworks. A second paper "*Towards Dynamic Services Compositions*" has also been submitted by SOA4All regarding the Design Time Service Composition topic.

- As full member of the NEXOF-RA, SOA4All has joined the five NEXOF-RA Architecture Board meetings held from 2008 to 2009. Those meetings have focused on the following issues:

  o First AB Meeting, 16th -17th April 2008. SOA4All has joined NEXOF for the launching of this high level team where all the projects were presented and the bases for the Invitation to contribute initiative were established.

  o Second AB Meeting, 27th -28th April 2008, Brussels. It has been devoted to collect the potential list of interesting topics for the first Invitation to Contribute.

  o Third AB Meeting, 2nd -3rd July 2008, Haifa. It has been aimed at deciding from the potential list of topics which ones will definitely open to contribute for the first Invitation to Contribute.

  o Fourth AB Meeting, 13th -14th October 2008, Brussels. This time, the Architecture Board has reviewed all position papers submitted by stakeholders in order to issue invitations to the Investigation Team.

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[6] It describes a lightweight service ontology and annotation mechanism for Web Service Description Language (WSDL)

[7] Semantic Description of Restful Services

[8] Web Service Modelling Ontology

o Fifth AB Meeting, 26th -27th January 2009, Brussels. The main purpose of this meeting has been the post-discussion of the first round of Invitations to Contribute and their results, and to finalize the second call for contributions.

At dissemination level, a networking session about "Research challenges and contributions for NEXOF, the NESSI Open Service Framework" proposed by NESSI has been coordinated by NEXOF-RA in collaboration with SOA4All at the ICT event, the most important forum hosted by DG Info at the European Commission for discussing information technology research and development at European level. Over 4500 people registered to this event. The session has focused on informing the participants about how they can take part in the development of NEXOF. In addition, an opportunity for collaborative research under the 7th Framework Programme has been on the agenda too. Over 30 people have attended the session and supported it through the official ICT Website. Lyon, France. November 2008.

Some of the planned actions to be done in the short term will consist of continuing collaborating to the Open Construction Process by participating to the 2nd Invitation to Contribute, launched in February 2009 regarding the Core Service Framework area in terms of submitting two papers: one based on the execution engine (runtime composition topic) and one based on the light-weight process modeling language. In addition, SOA4All will join the next Architecture Board meeting to be held in Brussels next 28th and 29th of April 2009. In addition, NEXOF-RA expects that SOA4All contribute to the glossary .This glossary is a selection of terms that is being prepared by the NEXOF-RA project, in cooperation with NESSI related projects, and is intended to form a common glossary across the projects and beyond. It takes many of its definitions from established standards or pseudo standards. These terms concern various aspects of the service lifecycle ranging from requirement analysis to operation. One of the inconveniences of such glossary with respect to the models that we have previously described is that the various terms are defined in isolation and the relationships between terms are not highlighted. This can easily lead to ambiguities and missing definitions. Its main advantage stands in the fact that it is much broader than the other models. SOA4All defines its terminology starting from the NEXOF-RA glossary in order to enable interaction with the other projects of the NESSI platform. In particular, in this section those terms of the glossary are selected that are of interest of the SOA4All project. SOA4All will propose modifications to some definitions and introduce new definitions to cover aspects that are relevant to the SOA4All project. The new definitions are identified by looking at the main objectives of the SOA4All project and at its case studies.

In addition, a day-to-day contribution to the Service Centric System Architecture of NEXOF-RA will be made by SOA4All. Today, the contributions of SOA4All have been limited to the aforementioned input to the service discovery topic. Further involvement was not yet possible in the large, as SOA4All was not yet in the position to contribute with own results. The SOA4All architecture and components specifications are still work in process, with expected deadlines by end of February 2009. From there on, SOA4All will be able to feed insights back to NEXOF-RA, starting, as planned, already with the 2nd Invitation to Contribute. In what the dissemination is concerned, NEXOF-

RA and SOA4All expect to attend the next ICT event[9] that will take place at the end of 2009 in terms of giving one common talk.

4.2 MASTER

It contributes to NEXOF-RA OCP in relation to the Architecture Board Meetings presenting main ideas and results. However, MASTER has not participated to the 1st Invitation to Contribute due to the lack of public results, which have coincided in terms of date with the launching of this call.(July'08).

Concerning planned actions to be done in the short term, MASTER has the intention to, participate to the 2nd Invitation to Contribute recently launched (February'09). At least, MASTER will contribute though some key results achieved by the project that are in accordance with the NEXOF-RA expected contributions. MASTER has studied the topics likely to be included in the 2nd Invitation to Contribute of the Open Construction Process. There are three of them which we identified to be relevant for MASTER:

- SLA (Service level Agreement) Parameters
- Dynamic Security in SOA and SOI
- Multi-level Security in Interconnected Systems SLA and QoS (Quality of Services).

Besides this expected contribution, MASTER will attend next AB meetings that will take place next April '09 in Brussels. In addition, MASTER will study future NEXOF-RA Open Construction Process calls for participation, to assess the possibility of new results from MASTER by that time which can be input to the NEXOF Reference Architecture. Moreover, the core MASTER partners are key contributors in the NESSI Trust, Security and Dependability Working Group. NESSI TSD produces security technology whitepapers that are also potential contributions to NEXOF-RA.

4.3 SLA@SOI

Current SLA@SOI collaboration actions with NEXOF-RA focus on technical exploitation of synergies as follows:

- Participating to the "Contribution to Standards" Collaborative WG. More precisely, NESSI/NEXOF-RA and SLA@SOI are co-leading this Collaborative WG. This implies strict collaborations in the organisation of meetings and in the other administrative tasks, including taking care of the collaboration instruments, editing documents, and reporting to the EC
- Contributing to the Open Construction Process, in relation to the 1st Invitation to Contribute concerning the Core Service Framework area in terms of Service Description, Design Term Service Composition and Service Discovery. In addition, SLA@SOI has also contributed to the Infrastructure and Quality of Service areas in relation to Infrastructures Services and Scalable Approaches to Service Oriented

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[9] http://ec.europa.eu/information_society/events/ict/2008/index_en.htm

Infrastructures respectively. Furthermore, SLA@SOI representatives have attended and participated to the five NEXOF-RA Architecture Board meetings already celebrated from the start date of the NEXOF-RA project to now. In these meetings, the main ideas and the SLA@SOI results have been represented, and integrated with the overall NEXOF-RA architecture. In addition, it contributes day to day to both the Adaptive Service-Aware Infrastructure (WP3) and the Service Centric System Architecture issues (WP2).

Besides the collaboration described above, planned actions of SLA@SOI in the short term focus on participating to the 2nd Invitation to Contribute launched by NEXOF-RA in February'09. This collaboration will regard in particular the Quality of Service Area, and more precisely the Service Level Agreements (SLAs) and Quality of Service (QoS) topic. Moreover, SLA@SOU plans to attend next Architecture Board meeting to be held in April'09 in Brussels, in order to comment/decide on the architecture developed by NEXOF-RA, aligning the activities of SLA@SOI with those of NEXOF-RA.

In addition to this, in the near future SLA@SOI intends to deliver to NEXOF-RA a first version of the overall architecture and of the specification of the modules for the 1st implementation of the SLA@SOI framework. This framework can be exploited as a source of architectural patterns for E-Contracting, Negotiation, Provisioning, Monitoring, Adjustment, and Infrastructure Management. SLA@SOI plans to contribute to NEXOF-RA also the first release of the framework, which is planned by the end of April 2009. All the modules (E-Contracting, Negotiation, Provisioning, Monitoring, Adjustment, and Infrastructure Management) will be released as Open Source (Eclipse license).

4.4 MORFEO EZWEB

Ezweb contributes to NEXOF-RA at technical level primarily by working closely with WP1 - Advanced User Service Interaction in the construction of the overall strategic vision as well as the definition of the conceptual model and architecture.

As a NSP is a member of the NEXOF-RA Architecture Board and participates in all the meetings held and contributes in the overall technical definition of NEXOR-A.

EzWeb is also committed in contributing to the Open Construction Process by providing contributions to those invitations to contribute akin to its research topics. Due to the fact that the main topics considered in the 1st Invitation to contribute were out of the scope of the project EzWeb did not contribute. Nevertheless, it is worth mentioning that other Morfeo-related project such as MyMobileWeb (another Morfeo but non-Strategic project) has contributed to both topics, Declarative UI Authoring Languages and Context Model and Universal APIs considered in the User Service Interaction Area.

Apart from being an NSP, EzWeb is a member and promoter of the Open Alliance on Service Front-Ends[10] (The ultimate goal of this initiative is work on a concrete vision

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[10] www.sfe.morfeo-project.com

shared by all its members, develops architecture and ultimately develops the final SW components. In this respect there are a lot of synergies with NEXOF-RA both as an adopter of NEXOF-RA results but also as a contributor/validator of pieces of the architecture in the service front-end layer.

Besides direct contributions to NEXOF-RA, Ezweb also tries to exploit synergies with NEXOF-RA though joint participation and organization of several collaboration/ concentration meetings and workshops:

- Services Front End (SFE) Collaboration Working Group Workshop, UPM, Madrid, 24 June 2008

- Service Front-End Collaboration Working Group Session, Internet of Services Collaboration meeting for FP6 & FP7 projects, Brussels, September 2008

- Open Alliance on Service Front-Ends workshop, Service Wave 2008, Madrid, 10th - 12th December 2008

Future collaboration actions between Ezweb and NEXOF-RA include the Ezweb commitment to contribute to the 2nd Invitation to Contribute planned for March '09 concerning the Metadata for Service Front End Resources (Phase I) and APIs for Service Front End Resources (phase I) topics as well as the intention to participate to the next concertation/ clustering meetings to strength the link with the NEXOF-RA project in order to reach key issues of common interest.

- Joint Workshops with EU FP7 Service Front-End Collaboration Working Group and Open Alliance on Service Front-Ends. This workshop may be organized independently or in the context of other events

- Participate in relevant concentration events such as the Collaboration Days or Future Internet related meetings whenever possible and/or applicable.

4.5 RESERVOIR

Today, both technical and dissemination contributions from RESERVOIR to NEXOF-RA include:

- **Collaboration with WP3 –** infrastructure services: In WP3, RESERVOIR transfers core elements of its architecture and requirements in order to embed central RESERVOIR concepts such as federation, scalability and elasticity as well as the related RESERVOIR functional components and architectural patterns into the NEXOF-RA approach to infrastructure services. This shall make NEXOF-RA the first SOA architecture that deeply embeds a cloud-computing approach.

  RESERVOIR has also contributed to the Open Architecture Specification Process with a position paper on infrastructure services that describes the central functional components of RESERVOIR architecture.

- **Collaboration with WP8 – Proof of Concept:** RESERVOIR is already developing as part of its own work plan several large scale proofs of concepts. One example is allowing a large-scale SAP enterprise application access to federated RESERVOIR resources and demonstrating automatic workload balancing. This has been partially demonstrated during the Cebit 2009 exposition in Germany as a joint IBM-

SAP cloud showcase. To contribute to WP8, RESERVOIR is therefore exploring the integration with functional components of the SLA@SOI project – as both projects are contributing to NEXOF-RA in the area of infrastructure service management. The aim of this partnership is to develop a joint proof-of-concept that demonstrates interaction between the service management functionalities and components provided by RESERVOIR and those by SLA@SOI.

- **Collaboration with WP9 – standardization:** The RESERVOIR project has already raised significant interest in the cloud computing world. Apart from having the OGF (Open Grid Forum) Europe Chapter as part of its consortium – RESERVOIR is becoming increasingly active in relation with standardization organizations and also some cloud providers such as Amazon. In the interaction with WP9 it is ensured that these activities are well interacting with NEXOF-RA standardization activities.

Regarding the NEXOF-RA Architectural Board - the Lead Architect of RESERVOIR is personally engaged here. Finally, the RESERVOIR contribution to NEXOF-RA draws on the outcomes from the Virtualized Service Platform Working group. This Group is steered by the RESERVOIR coordinator and has contributed to such events as the ICT Conference in Lyon. It provides a forum for the discussion with other EC projects – not necessarily NSPs – that address the domain of virtualized infrastructures services – such as the IRMOS project.

5 COLLABORATION WITH OTHER NEXOF-RA RELATED PROJECTS

5.1 COMPAS

COMPAS through its unique focus of research and approach on compliance issues in highly dynamic service-based systems is contributing (according to the NESSI Holistic view) to not only the NESSI Open Framework but also the NESSI Adoption where compliance to business regulations and/or stated user service requirements are key to gain momentum in using NESSI Landscape services marketplace.

More precisely COMPAS by advancing the state of the art in SOA in the focused area of compliance to the broad sense will offer to the NESSI Open Framework a "design-for-compliance" technology where various compliance concerns could be acquired, modelled, realized, enforced and validated.

By focusing on a comprehensive and integrated SOA approach for Business compliance (not limited to regulations and including the whole compliance lifecycle), COMPAS will also impact the design and setup of the NESSI Open Framework while contributing to its development through concepts, innovative models, languages and architectural patterns for examples.

In terms of contributions to NESSI (focus NESSI SRA) and NEXOF (focus NEXOF-RA project) coming from COMPAS and to be reported we can quote the following ones:

- Contribution to referring to and extending the NEXOF Glossary of terms.

- Contribution to NEXOF Reference Model and Reference Architecture specifications mainly achieved through active participation and contribution to the 1st Open Construction Cycle research topics where main effort of COMPAS was put on Core Service Framework Area and more specifically Service Discovery and Design Time Service Composition topics where two position papers were submitted:

  - A position paper titled "Collaborative web service discovery" and authored by Aliaksandr Birukou, Vincenzo D'Andrea (UNITN), and Natallia Kokash (CWI) [BDK08] has been submitted and accepted to the Service Discovery topic. The proposed approach has been included in the conceptual summary of contributions[11].

  - A position paper "Design-time Service Composition with Reo Coordination Tools" authored by Farhad Arbab, Natallia Kokash and Ziyan Maraikar [AKM08] has been submitted and accepted to the "Design-time Service Composition" track.

  Design patterns derived from the proposed approaches are now under integration by NEXOF-RA coordinators.

For next period, COMPAS Project and partners based on results achieved will continue to support NESSI and NEXOF through appropriate instruments would it be

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[11] http://www.nexof-ra.eu/sites/default/files/NEXOF-RA-ItC-SERVICE%20DISCOVERY.pdf

through NESSI Working Groups, NESSI Committees (SRA, Standardization) and/or Investigation Teams. As such COMPAS is committed to:

- Participate and contribute to the 2nd Invitation to Contribute which has been published as well as successive ones

- Disseminate project's results relevant for NEXOF (inc. Reference Models, Reference Architecture, Architectural Choices and Patterns, Standards …)

- Support NESSI and NEXOF through active participation to NESSI WGs and Committees (e.g. SRA, Standardization) and concertation with "Software and Service Architectures and Infrastructures" (SSAI) Collaboration Working Group (CWG) that COMPAS Project coordinator is coordinating

- Further team with NEXOF-RA for what concerns architectural results and their exploitation.

5.2 S-Cube

Based on discussions with S-Cube's Industrial Advisory Board (IAB) and its members –Stefano De Panfilis (Chair of the NESSI SRA Committee and coordinator of NEXOF-RA), Pascal Bisson (Member NESSI SRA Committee and NEXOF-RA member), Frederic Gittler (Vice-Chair NESSI Steering Committee and NEXOF-RA Chief Architect), Franz Kudorfer (Chair of NESSI Standardization committee and NEXOF-RA member), the following actions agreed are currently carried out by S-Cube in order to closely collaborate with the NEXOF-RA project: On the one hand, S-Cube contributes to the Open Process by participating to the several NEXOF-RA Architectural Board Meetings. Two representatives of S-Cube have joined the five AB meetings held during 2008 and the beginning of 2009.On the other hand, other collaboration activities between S-Cube and NEXOF-RA consist of clustering/ concertation meetings that have a major impact on creating links between projects and projects participants. In this context, both, Stefano De Panfilis[12]and Klaus Pohl[13] jointly coordinate and contribute to the SSAI&E (Software and Service Architectures and Infrastructures) Collaboration Working Group. In this context, S-Cube and NEXOF-RA have taken advantage of several concertation meetings collocated in related events in order to display what the SSA&I consists of, main objectives, plans and activities to be carried out. During the first year of the NEXOF-RA project, The SSAI&E Collaboration WP has been presented in the events listed below:

- One concertation meeting hosted by the European Commission, DG Information Society, SSA&I Unit, aimed at preparing the Work Programme 2009-10 and to launch the FP7 projects. As a result of the concertation meeting, the SSAI&E working group has been set up in March '08

- S-Cube has presented -in collaboration with NEXOF-RA – the main objectives and a 1 year for the "Service Architectures" Collaboration WG. The plans have been

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[12] Coordinator of NEXOF-RA

[13] Network coordinator of S-Cube

presented and discussed in dedicated sessions at the concertation meeting which have taken place in September '08.

- Joint Organization between NEXOF-RA and S-Cube of one Collaboration Working Group meeting co-located with the Future Internet Assembly, collocated at the Service Wave 2008 conference. The Service Wave conference series aims at establishing the premier European forum for researchers, educators and industrial practitioners to present and discuss the most recent innovations, trends, experiences and concerns in Software Services and related underlying network technologies. December '08.

With respect to the planned actions and collaborations in the short term, for what concerns work in the area of the NEXOF-RA glossary, there exist plans to cross-correlate the S-Cube Knowledge Model. Finally, the strong bond and alignment between S-Cube and NEXOF-RA by means of the S-Cube Industrial Advisory Board will be maintained and strengthened. Key people from NEXOF-RA, namely, Stefano De Panfilis (Chair of the NESSI SRA Committee and coordinator of NEXOF-RA), Pascal Bisson (Member NESSI SRA Committee and NEXOF-RA member), Frederic Gittler (Vice-Chair NESSI Steering Committee and NEXOF-RA Chief Architect), Franz Kudorfer (Chair of NESSI Standardization committee and NEXOF-RA member), are members of the S-Cube IAB, thereby providing guidance to the S-Cube project with respect to industry relevance and alignment.

5.3 NESSI 2010

The collaboration between NEXOF-RA and NESSI 2010 focuses at the communication level and it is aimed at setting up a bi-directional channel to ensure that the NESSI community is aware of the NEXOF-RA advances and, specifically as well as that the NEXOF-RA partners are aware of NESSI advances. As such, NESSI is a major contributor to NEXOF-RA's awareness efforts. In this context, NESSI contributes to the promotion of the NEXOF-RA ideas and evolution by:

- **Organizing communication meetings for all NSPs used to define common activities and actively share dissemination opportunities**. The 1st meeting was held in 09/2008; the 2nd meeting (conference call) in February'09 and following meetings will be organized during 2009: The 1st Communication & Dissemination collaboration meeting has taken place in Brussels with all NESSI SPs in September'08. Dissemination partners from Morfeo Ezweb, Master, NEXOF-RA, SLA@SOI and SOA4All, have attended this meeting. Main objectives of the meeting are listed below:

  o Presentation of the NESSI communication activity and services available to the NSPs

  o Presentation by each NSP of its project, main milestones and dissemination activity

  o Definition of the coordination level between NESSI and NSPs on communication.

Following the presentation, several topics such as the usage of the NESSI logo, the user orientation of the NSPs, the visibility in the Wikipedia, the links to the

NESSI web site, the management of events, main NSPs contact points or the Service wave and ICT advertising on the NSPS web sites have been discussed. In addition, the meeting has concluded to three major needs:

- o The positioning of NEXOF should be clear on the NESSI Website.

- o The use cases of the NSPs can be contributed to the NESSI Website for dissemination.

- o The NSPs contribute to NEXOF and this should be clarified with a "contributing to NEXOF" logo.

Besides, the First meeting, The 2nd Communication & Dissemination collaboration meeting has organized as a teleconference with all NESSI SP concerning in February'09. The meeting has focused on:

- o Increasing the information channel towards all NSP partners, ensuring that all partners have a clear understanding of NESSI and NEXOF.

- o Increasing the information channel between all NSPs, ensuring that the evolution of their contributions to NEXOF is fully visible and can, therefore, also is made visible at NESSI level and beyond.

- o The creation of a use case section as discussed in the September meeting.

- o Any other needs that the NSPs wished to express and where NESSI can provide support. This includes also the fact that NESSI is evaluating the addition of a blog structure based on Word press[14] and the meeting:

- **Including NEXOF-RA in NESSI's communication channels:** NESSI 2010 contributes to disseminate NEXOF-RA by creating a specific page dedicated to NEXOF-RA on the NESSI Web site[15] .NESSI also includes information about NEXOF-RA in each NESSI newsletter (issued quarterly) and publishes several news about NEXOF-RA in the latest news section of NESSI on the home page. NESSI 2010 also select NEXOF-RA as the "focus on" project for one of NESSI's newsletter and creates a specific news page dedicated to the NSPs, that is fed through syndication of the latest news on each NSP's Web site. This provide a central point for the NESSI Community and the NSPs to view all information without unnecessary duplication of effort

- **Events for targeted (NEXOF-RA) or collaborative (all NSPs) sess**ion: A common NSPs session has been organized during the ICT'08. This networking session has been already mentioned in the section 3.4 concerning the existing collaboration actions with the NESSI SP, in particular with the NEXOF-RA project. In addition, Service Wave'08 also has given the NSPs the opportunities to organize workshops and create awareness and participation to their goals. The service wave event has been aimed at establishing the premier European forum for researchers, educators and industrial practitioners to present and discuss the most recent innovations, trends, experiences and concerns in Software Services (or the "Future

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[14] www.wordpress.org

[15] www.nessi-europe.com

of the Internet of Services") and related underlying network technologies. Besides of these past events, the 2009 target events include:

- EU Collaboration meeting for FP6 and FP7 projects on Objective 1.2. A single session for all NSPs has been proposed. Not confirmed yet. June'09, Brussels, Belgium

- Summer School in Heraklion Crete in June'09. Nothing except advertising as this seems already organized

- Service Wave 2009.NESSI is finalizing the organization in few weeks then announcements and then calls for papers and for workshops. The NESSI idea is to push the NSPs to submit a common session there if possible. If in addition, it would be possible to have a common session in the programme, this could be good, maybe focusing on scenarios, users etc as we want to introduce users. Stockholm, December'09

- The Future Internet Assembly (FIA).The NESSI objective is to propose a common session for the NSPs there. Stockholm, Sweden.December'09.

In addition, a list of proposed events will be shared across NSPs (through a private section on the NESSI Web site or other solution currently being analyzed) and a NSP communication mailing[16] has been created at enabling all NSPs to easily share information between them and with the NESSI Communication team.

5.4 Other Specific collaboration

Other projects have already contributed to the Open Construction Process of NEXOF-RA in relation to the 1st Invitation to Contribute as follows:

Core Service framework Area

- Service Description Techniques Topic: Main projects listed below have contributed to this topic as follows:

Institution/Company	Project	Title
Elsag Datamat	**BREIN**	**Service Description Techniques**
Lancaster University	**SeCSE**	**Faceted Service Description**
Clausthal University of Technology	**OPEN**	**A Component Model supporting Proactive Configuration of Service-Oriented Systems**

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[16] nessi-nsp-comm@nessi-europe.eu

CRP Henri Tudor	ADICT	Applying ISO/IEC-15504 PRM approach and GORE techniques to model and describe services
Institute for Cognitive Sciences and Technologies, National Research Council	NONE	An ontological foundation for the description of service systems

- Interoperability of Message-Based Service Interaction Topic: The "INTEROP Investigation Team" elaborates a document providing a survey of standards related to interoperability in the context of message-based service interaction. This document also collects guidelines, best practices and patterns for the solution of messaging-related interoperability problems, and places the findings into the context of the ensuing conceptual NEXOF Reference Architecture. The document is developed by collaboration of Stanislav Pokraev, Telin (NL), Eric Piel, TU Delft (NL), Francisco Javier Diez, Tekniker (ES) and Peter Graubmann, Siemens AG (D) who is charing this activity. After the initial Kick-off meeting in Brussels, work was organized by email exchange and regular conference calls. The deadline for delivering the document is end of February.

User Interaction Area

- Declarative UI Authoring Topic: The two deliverables will be merged into one single document that will contain:
    - The work on the specification of Declarative authoring Language for NEXOF-RA will focus on defining a Model for a declarative authoring language that distills the best parts of the languages contributing in this work. It will be based on the model offered by UsiXML17 and will be extended by features offered by IDEAL and Teresa/Maria XML[18].
    - The model will include both Abstract UI and Concrete UI and the level of detail will be defined to suit the objectives of the call.
    - Study gaps in the existing languages and the final model proposed.
    - Create a converged/common roadmap for the declarative authoring languages.

This work will serve a input for the W3C "Model-based User Interfaces Incubator Group" where various members of the team participate. Main projects mentioned below have contributed to this topic;

Institution /Company	Project
TID	CELTIC MyMobileWeb
CNR	FP7 OPEN & ServFace
UCL	FP7 Human & UsiXML Consortium

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[17] Home of the USer Interface eXtensible Markup Language

[18] Extensible Markup Language

UCL	FP7 Human & UsiXML Consortium
UIB	SOSA (National Project)
UPM	CELTIC MyMobileWeb
Nokia Siemens Networks, Hungary	SharME & Other internal NRC projects
Telematica Instituut, Netherlands	Freeband Awareness

- Context Model & APIs Topic:A new context ontology will be created that:
    - The model created by UsiXML in their User Computing Platform Environment Model will be used.
    - Other relevant existing standards will be considered in the creation of this model.

Main projects listed below have already contributed to this topic as follows:

Project	Title
SharME19 & Other internal NRC projects	Validate model based on Telco Use Cases.
FP7 Human & UsiXML Consortium	Initial model created in the context of the User Computing Platform Environment Model.
CELTIC My Mobile Web	Related work in W3C Delivery Context (TID) ontology, survey of SoTA and integration of new aspects in the resulting models (UPM).
SOSA	Document reviewer and contributions to new aspects of the resulting model.

Infrastructure Area

- Definition of Infrastructure Services Topic: Contributions/participation from SOCRADES[20] (FP6)/ SODA [21](ITEA2) projects (Schneider Electric) has already contributed to this topic. However, SOCRADES contribution SOCRADES/SODA has been different from the others in that the contribution focused on services which involve interaction with the physical world - particularly service-based approaches to manufacturing and production processes. The others all contributed to a survey and classification of software execution services, including scientific experimental infrastructure, hosting of virtual machines, job submission (traditional Grid) and application frameworks. There is also some work on definition of a

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[19] Nokia Research Center

[20] http://www.socrades.eu/Home/default.html

[21] http://www.soda-is.com/eng/about/index.html

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framework for service metrics which is applicable not only to resource infrastructure but also to services more generally.

6 CONCLUSION

All projects involved in the Collaboration Plan recognize how important is to keep the flow of information open to other European projects in order to facilitate the identification of synergies. In addition to this, the collaboration opportunities described here show clear potential to significantly increase the impact of the NEXOF-RA project. Collaboration activities among several projects can generate a more relevant impact and better performance as a whole rather than relying on outcomes at project level.

Furthermore, all projects considered by NEXOF-RA as sources for contributions and collaboration have been selected based on the degree of compatibilities and complementarities of technical work, the ambition of reaching high-level objectives and the synergies between existing partners, all of them considered important assets to make a plan become a reality.

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